

The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.

Paper No. 15

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte RICHARD B. HALSEY

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Appeal No. 2001-2457  
Application No. 09/168,979

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ON BRIEF

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Before PAK, WALTZ, and TIMM, Administrative Patent Judges.  
WALTZ, Administrative Patent Judge.

**DECISION ON APPEAL**

This is a decision on an appeal from the examiner's final rejection of claims 21 through 30, which are the only claims remaining in this application. We have jurisdiction pursuant to 35 U.S.C. § 134.

According to appellant, the invention is directed to a process for recovering purified cyclopentane from a hydrocarbon stream that contains neo-hexane, hydrocarbon impurities and at least 25 wt. % of cyclopentene (Brief, page 2). Illustrative independent claim 21 is reproduced below:

21. A process which comprises:

- (a) distilling a hydrocarbon stream that contains neo-hexane, hydrocarbon impurities, and at least 25 wt.% of cyclopentene to separate a neo-hexane-containing fraction from a lower-boiling fraction that contains cyclopentene and hydrocarbon impurities;
- (b) hydrogenating the lower-boiling fraction in the presence of a catalyst to produce a mixture of cyclopentane and saturated C<sub>4</sub>-C<sub>5</sub> hydrocarbons; and
- (c) distilling the hydrogenated mixture to recover cyclopentane having a purity greater than 85%.

The examiner relies upon the following references as evidence of obviousness:

Derrien et al. (Derrien)	4,361,422	Nov. 30, 1982
Kanne et al. (Kanne)	0 799 881 A2	Oct. 8, 1997
(published European Patent Application) <sup>1</sup>		

The claims on appeal stand rejected under 35 U.S.C. § 103(a) as unpatentable over Kanne in view of Derrien (Answer, page 3). We reverse this rejection essentially for the reasons stated in the Brief, Reply Brief, and those set forth below.

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<sup>1</sup>We rely upon and cite from a full English translation of this document, previously made of record.

### OPINION

The examiner finds that Kanne teaches a process for the recovery of cyclopentane which comprises removing a C5 hydrocarbon mixture containing cyclopentene from a distillation column, catalytically hydrogenating the mixture, and then distilling the hydrotreated mixture to recover cyclopentane (Answer, page 3, citing page 4, ll. 10-16, of Kanne). The examiner further finds that the feed sent to the initial distillation step contains 10-30% cyclopentene. *Id.* The examiner finds several differences between Kanne's process and that of the claimed process (*id.*). With regard to the specific catalyst employed, the examiner has applied Derrien for the general teaching that it was known in the art to use certain metal catalysts including nickel for the hydrogenation of C5 hydrocarbons such as cyclopentene (Answer, page 4).<sup>2</sup>

The examiner also finds that Kanne is "silent" about an initial distillation hydrocarbon stream that contains neo-hexane, as well as being "silent" about the initial distillation step separating a neo-hexane containing fraction

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<sup>2</sup>A further discussion of Derrien is unnecessary to this decision as this reference does not remedy the deficiencies in Kanne as noted *infra*.

from a lower boiling fraction which contains cyclopentene and hydrocarbon impurities, as required by the claims on appeal (Answer, page 4).

The examiner concludes that it would have been obvious to one of ordinary skill in the art "to initially distill a cyclopentene feed containing higher boiling point fraction in order to obtain cyclopentene and impurities, including neo-hexane, because the reference of EP 799881 A does not limit the components separated from cyclopentene in the initial distillation." Answer, page 4. In other words, the examiner considers the Kanne disclosure "to encompass initially separating any fractions from cyclopentene." *Id.*

Appellant argues that there are "huge" differences in the initial distillation process of Kanne and the claimed invention (Brief, page 7). Appellants argue that their first distillation step separates neo-hexane from a fraction that contains cyclopentene while Kanne is silent with regard to neo-hexane as a starting feed material (Brief, pages 6-7).

Kanne fractionally distills a feed of a partially hydrogenated pyrolysis gasoline to remove at a suitable plate a high concentration of cyclopentane and cyclopentene (page 4, ll. 10-16). The concentrations of cyclopentane and

cyclopentene (each 10-30 wt.%) at this suitable plate are significantly higher than in the top product (page 5, ll. 1-3). Kanne teaches that, by selecting the optimum plate for discharge, "it is possible to minimize the concentration of the higher-boiling C<sub>6</sub> -components, which are significant in terms of adjusting the cyclopentane to the desired specification." Page 5, ll. 6-9. Since it is uncontested that the boiling points of cyclopentane (120.7 °F.) and neo-hexane (121.5 °F.) are very similar and render separation difficult (specification, page 1, ll. 14-20), we determine that the examiner has not presented a sufficient factual basis to support a *prima facie* case of obviousness for step (a) of claim 21 on appeal. On this record, the examiner has not presented convincing evidence or reasoning to support the premise that Kanne separates neo-hexane from cyclopentene by the initial distillation step of the reference.

The examiner argues that because Kanne teaches the separation of a cut containing C<sub>5</sub> hydrocarbons, it naturally encompasses the separation of all C<sub>6</sub>+ cuts including neo-hexane by definition (Answer, page 6). We disagree. As discussed above, the removal of neo-hexane from a cut including large amounts of cyclopentane (as in Kanne) would have been difficult

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due to their extremely close boiling points. Furthermore, the cuts are not done by the examiner's definition as Kanne teaches that even by selecting the optimum plate for discharge, there will be some concentration of higher-boiling C<sub>6</sub> -components in the C<sub>5</sub> cut which can affect the desired cyclopentane purity (page 5, ll. 6-9; see the Reply Brief, pages 1-2).

Accordingly, we determine that the examiner has provided insufficient evidence or reasoning that the initial distillation step of Kanne would have suggested the initial distillation step of the claimed subject matter within the meaning of 35 U.S.C. § 103(a). Therefore we cannot sustain the examiner's rejection of claims 21-30 under 35 U.S.C. § 103(a) over Kanne in view of Derrien.

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The decision of the examiner is reversed.

**REVERSED**

CHUNG K. PAK	)	
Administrative Patent Judge	)	
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	)	
	)	
	)	BOARD OF PATENT
THOMAS A. WALTZ	)	APPEALS
Administrative Patent Judge	)	AND
	)	INTERFERENCES
	)	
	)	
	)	
CATHERINE TIMM	)	
Administrative Patent Judge	)	

TAW/jrg

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